

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY
Control No. (TCN) 08152 with Battelle Chapel Hill Operations for the U.S. Army Environmental Policy Institute

DECEMBER 2008 REPORT

Note to Readers: Pages 1-14 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 15.

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Item 1. New International Renewable Energy Agency Opens in January

The International Renewable Energy Agency (IRENA) will be established January 26th in Bonn, Germany, as an intergovernmental organization to promote renewable energy worldwide. It will assist member countries in matters of technology transfer, assessment and dissemination of information on new technologies and best practices, and will help support projects related to renewable energy and tackling global warming. All interested UN member states are invited to become members of IRENA at the Founding Conference in January. The Japanese government declined to join, stating that the agency's functions overlap those of the International Energy Agency. The organization was initially promoted by Denmark, Germany, and Spain, with strong support from other countries.

Military Implications:

Military personnel seeking to implement the Army Strategy for the Environment should explore potential relations with IRENA. Although its mandate is primarily consulting on renewable energy technology, it is reasonable to assume that IRENA will also address policy and regulatory issue for global energy security.

Sources:

IRENA website: www.irena.org

Promoting IRENA for a Stable Climate. Joint Press Release Germany-Denmark-Spain

http://www.irena.org/downloads/Press/PM_SideEvent_IRENA_081211_EN.pdf

Japan won't join intl eco-agency

<http://www.yomiuri.co.jp/dy/national/20081231TDY02306.htm>

Item 2. France Supports Brazil's Permanent UN Security Council Seat to Promote Environmental Issues

Increasing Brazil's role in international affairs, including a permanent seat on the UN Security Council to provide leadership on environment-related issues, was strongly supported at the second Brazil-EU summit, held in December 2008, by Nicolas Sarkozy, French President and holder of the EU rotating presidency. During the visit, the French and Brazilian leaders also addressed, *inter alia*, security and military affairs. Meantime, Brazil announced that its new strategic defense plan increases the focus on environmental protection and energy security.

Military Implications:

If Brazil is added as a permanent member of the UN Security Council, then it is reasonable to assume that the environment, as a security component, will achieve greater world attention. In anticipation of this potential change, military to military relations with Brazil might include discussions of the Army Strategy for the Environment and related environmental security programs.

Sources:

Sarkozy supports Brazil's bid for security council

<http://www.iht.com/articles/ap/2008/12/22/news/LT-Brazil-France.php>

UPDATE 1-Brazil, EU to prepare joint crisis position for G20

<http://www.reuters.com/article/vcCandidateFeed2/idUSN2251166120081222>

Item 3. Conference on Future of the Dutch Military Includes Environmental Security as an Emerging Military Role

The Netherlands Ministry of Defence and the Netherlands Institute of International Relations (Clingendael) held a conference December 15–17, 2008 in The Hague on future roles for the Dutch armed forces. The conference was part of the Future Policy Survey, a comprehensive interdepartmental look at future developments and scenarios to the year 2030 to update the Netherland's defense policies and roles with NATO and the EU. There was some discussion of re-nationalization of defense policy due to ineffectiveness of the EU and NATO. Among the presentations was an overview of future environmental security roles for the military and why these roles will be increasing.

Military Implications:

Military personnel with responsibilities in environmental security and military-to-military relations with the Netherlands should review the presentations (especially the Butts presentation) from the conference to see what might be relevant for further study and to keep abreast of the whole Future Policy Survey process.

Source:

Conference “Challenging uncertainties: the future of the Netherlands’ armed forces”

<http://www.clingendael.nl/cscp/events/20081216/>

Item 4. Likelihood of Climate Lawsuits Increasing

Advances in environmental science and computer modeling are improving estimates of human-influenced climate change and its influence on extreme weather events. Some experts suggest that the likelihood of related litigation might increase, as sectors and companies that are considered serious contributors to climate change or promoters of public misinformation could be held liable for climate-change effects. *Beyond Adaptation*, a paper by WWF UK, notes that a new UN framework to compensate victims of climate change in developing countries is needed and suggests an international compensation fund to be set up by some future UN treaty.

Military Implications:

The trend of improving environmental regulations and applying the “polluter pays” principle is increasing, with no exception for any industry. To avoid eventual litigation, the military should consider documenting its efforts to reduce greenhouse gas emissions and enhancing its efforts to include environmental factors in planning and operations.

Sources:

Science paves way for climate lawsuits

<http://www.guardian.co.uk/environment/2008/dec/09/oil-business-climate-change-flooding>

Beyond Adaptation

http://www.wwf.org.uk/research_centre/index.cfm?uNewsID=2505

New U.N. pact may be needed for climate victims: WWF

<http://www.alertnet.org/thenews/newsdesk/L3148346.htm>

Item 5. Water and Environmental Research Center to Be Established in UAE

The UAE University in Abu Dhabi has been funded to create a Water Environment Centre of Excellence. The research generated will be published, contributing to solving water- and environment-related problems in the UAE as well as in neighboring countries. Mohsin Al Sharif, head of the new center, said that one of the objectives is also to review UAE water-related policies.

Military Implications:

USCENTCOM personnel concerned with water and environmental security issues should contact the new center to exchange ideas and offer assistance to help improve water security for the region and anticipate potential changes in water relations and policies in the region.

Sources:

3 UAEU Centers of Excellence win NRF funding

http://www.uaeu.ac.ae/news/20081110_nrf_3_ueau_centers.shtml

Universities to gain four new centres for academic research

<http://gulfnews.com/nation/Education/10267860.html>

Item 6. Japan Sets up e-Waste Collection Locations to Recycle Rare Metals

Odate city in northern Akita Prefecture, Japan has set up collection boxes for people to get rid of old cell phones, hair dryers, and other electronic devices to recover rare metals. The demand for rare metals is increasing with the growth of high tech products. Hence, availability and future cost of indispensable rare metals is of increasing concern. This collection of e-waste and recycling is spreading throughout Japan with the help of subsidies from the Environment Ministry.

Military Implications:

Military personnel working on electronic waste and rare metals supplies should review these programs to see what approaches might be transferrable to military installations.

Source:

City takes lead in recycling rare metals

<http://www.asahi.com/english/Herald-asahi/TKY200812200045.html>

Item 7. Technological Advances with Environmental Security Implications

7.1 New Protection for Plastic Electronics

Researchers at the University of Texas at Dallas have developed a new form of self-healing for the metal oxide thin film layers that protect the plastic covering for a wide variety of electronic devices, e.g., displays, low-cost solar cells, and chemical- and pressure-sensitive sensors. These layers are subject to damage from moisture and flexing. The technique uses a nanocomposite material that combines a water-degradable polymer and a titanium tetrachloride healing agent, which act together to seal minute defects in the protective layer.

Military Implications:

The military should follow this development for its applicability to the protection of electronic devices used in operational and environmental sensing systems.

Source:

Self-healing protection for plastic electronics

<http://www.nanowerk.com/spotlight/spotid=8555.php>

7.2 Reusable Hydrogels Detect and Remove Heavy Metals from Contaminated Water

Scientists at the Department of Chemistry, University of California at Berkeley developed a group of low cost protein-cross-linked hydrogels, incorporating pea metallothioneins, for the detection and sequestration of heavy metal ions, such as cadmium, in contaminated water. The compounds shrink upon absorbing metals, providing a detection capability, and can be reused after the bound metal ions are removed by chelation. The researchers are also working on applying the same technique to other types of pollutants.

Military Implications:

The military should follow this technology, as it develops, for eventual application to systems for environmental testing. Further work will be needed to also apply it to bulk decontamination.

Source:

Berkeley chemists pioneer low-cost water testing devices

<http://www.physorg.com/news149261463.html>

7.3 Increasing Energy Efficiency Technologies

7.3.1 Nanoparticles Increase Solar Cell Light-gathering Efficiency by 30%

Work led by Kylie Catchpole, now at the Australian National University, has resulted in the discovery that a thin film of metallic nanoparticles applied to the surface of a solar cell can increase light capture for long-wavelength light by a factor of more than ten, and improve overall cell light-gathering efficiency by 30%.

Military Implications:

The military should follow up on this environmentally significant work as it progresses toward full implementation in solar cell design.

Source:

Enhancing solar cells with nanoparticles

<http://www.physorg.com/news149266955.html>

7.3.2 Light Emitting Diodes Offer Big Environmental Advantages

A recent paper in the special energy issue of *Optics Express* summarizes the tremendous environmental advantages LEDs offer over other lighting means, and predicts “a revolution in energy-efficient, environmentally-sound, and powerfully-flexible lighting”. They are 5 to 20 times as energy-efficient as other light sources, and their manufacture does not use toxic materials such as mercury. They also offer controllable color and polarization. Researchers in materials science and engineering at the University of Florida produced organic LEDs in various colors that achieve efficiencies of 50 lumens/watt (with hopes for 100 lumens/w or higher, eventually).

Military Implications:

Military personnel responsible for product planning and design should ensure that these advantages of LEDs are considered in lighting device selection for materiel procurement.

Sources:

Transcending the replacement paradigm of solid-state lighting:
<http://www.opticsinfobase.org/oe/issue.cfm?volume=16&issue=26>

The Green (and blue, red, and white) lights of the future
<http://www.physorg.com/news148708739.html>
Efficient organic LEDs a step toward better lights
<http://www.physorg.com/news149258474.html>

Item 8. Updates on Previously Identified Issues

8.1 Dangers Increase from “Amateur” Genetic Engineering; the Biological Weapons Convention to be Updated

Scientists from the Vanderbilt Medical Center and the University of North Carolina at Chapel Hill have used genetic engineering techniques to produce a new SARS-like virus affecting bats and transmittable to mice, in order to study such transferences. Some scientists believe these kinds of experiments might trigger new biosecurity problems. “Garage” bioengineering development (“synthetic biology”) could be done by amateur scientists. The required knowledge is now widely available and affordable equipment is easy to obtain. So far no instances of terrorists exploiting this field have been reported. Another possibility is the accidental release of harmful new organisms into the environment by well-intentioned amateur experimenters.

In the meantime, the annual session of States parties to the Biological Weapons Convention reiterated the need to improve biosafety and biosecurity, increase awareness, and develop codes of conduct for preventing the misuse of bioscience and biotechnology research. The Convention may be updated at the next review conference to be held in 2011 to cover potential new threats. After the meeting, Russia announced that it backs a legally binding mechanism for enforcing the Biological Weapons Convention. [See also *ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations* in January 2007 and other items in previous environmental security reports on this theme.]

Military Implications:

Since the risks of irregular use of synthetic biology are increasing, new international regulations seem inevitable. The military and its relevant contractors should consider collaborating in the establishment of international safety standards, and anticipate potential regulations in the planning of future R&D in these areas. Meantime, it should also investigate measures for detecting occurrences of such experimentations, and protection against negative consequences.

Sources:

Amateurs are trying genetic engineering at home
http://news.yahoo.com/s/ap/20081225/ap_on_sc/do_it_yourself_dna

Man-made SARS virus spreads fear
<http://www.canberratimes.com.au/news/local/news/general/manmade-sars-virus-spreads-fear/1394539.aspx?storypage=1>

Analysts Debate Bioterror Risks
http://gsn.nti.org/gsn/nw_20081211_8851.php

Informal Advance Report of the Meeting of States Parties

[http://www.unog.ch/80256EDD006B8954/%28httpAssets%29/C70514F42F7BF072C1257516005B1E7A/\\$file/BWC+MSP+2008+Advance+Report.pdf](http://www.unog.ch/80256EDD006B8954/%28httpAssets%29/C70514F42F7BF072C1257516005B1E7A/$file/BWC+MSP+2008+Advance+Report.pdf)

The 2008 Meeting of States Parties (BioWeapons Prevention Project daily reports)

<http://www.cbw-events.org.uk/MSP08-combined.pdf>

Russia Backs Legally Binding Oversight System for Biological Weapons Convention

http://www.globalsecuritynewswire.org/gsn/nw_20081209_7554.php

8.2 Progress in the Elimination of Chemical Weapons Stockpiles

Participants to the 13th session of the Conference of the States Parties to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction held at The Hague, December 2-5, 2008, noted progress as nearly half of the stockpiles of chemical warfare materials declared by possessor States have been verifiably destroyed, it and reiterated the call that the actions be completed by the required April 29, 2012 deadline. Two countries have finished the operations, work continues in India, Russia and U.S., and Japan has begun the cleanup of chemical weapons abandoned in China during World War II, while Libya has yet to begin the process. The U.S. has already acknowledged that it can't meet the deadline and there are also considerable doubts about Russia and Japan meeting it. One of the main issues considered at the meeting was the 2009 budget for the convention's verification and monitoring body, the Organization for the Prohibition of Chemical Weapons. [See also *Problems with Destruction of Chemical Weapons and Potential Proliferation* in October 2007, and other related items in previous environmental security reports.]

Military Implications:

[Similar to previous on this issue] The efforts to speed up chemical weapons destruction should be increased. The state of current and potential weaponizable chemicals and of chemical plants should continue to be reviewed in light of possible violations of the CWC or of eventual amendments to the CWC. Those with responsibilities in this area should consider new ways to speed international compliance and improve efficiency of the CWC regulations.

Sources:

Thirteenth Session of the Conference of the States Parties

<http://www.opcw.org/documents-reports/conference-of-the-states-parties/thirteenth-session/>

Ban calls for continued efforts to eliminate scourge of chemical weapons

<http://www.un.org/apps/news/story.asp?NewsID=29166&Cr=disarmament&Cr1=chemical+weapon>

U.N. Chief Promotes Chemical Disarmament

http://www.globalsecuritynewswire.org/gsn/nw_20081203_7682.php

8.3 New Nuclear Disarmament Initiatives

8.3.1 Global Zero, a New Initiative for Promoting Global Nuclear Disarmament

Global Zero is a new effort launched by international leaders—including former heads of state and top diplomatic and defense officials—to eliminate all nuclear weapons worldwide within 25 years. It wants to encourage the international community to establish safeguards and audits for disarmament, using dialogs and strategies different from past approaches. The group plans to organize a global meeting in January 2010, prior to the Nuclear Non-Proliferation Treaty Conference to be held in May 2010. Meantime, the EU also aims to be a leader in nuclear

disarmament, suggesting new measures, including a worldwide prohibition on nuclear tests. [See also *Nuclear Safety* in September 2007 and other related items in previous environmental security reports.]

Military Implication:

If not already part of the process, relevant military personnel should seek to be involved in the Global Zero and other efforts for nuclear disarmament strategies' revision.

Sources:

Global Zero <http://www.globalzero.org>

A world without nuclear weapons

<http://www.guardian.co.uk/commentisfree/2008/dec/08/nuclear-nuclearpower>

World leaders try to ban nuclear weapons

<http://www.iht.com/articles/ap/2008/12/06/america/NA-US-Eliminating-Nuclear-Weapons.php>

EU pushes for cuts in global nuclear arsenal

<http://euobserver.com/9/27260/?rk=1>

8.3.2 Central Asia Becomes Nuclear Weapon-Free Zone

With the Kazakh Senate approving the Central Asian Nuclear Weapon-Free Zone treaty, and Kazakhstan President Nursultan Nazarbayev expected to ratify it shortly, Central Asia—including Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan — becomes a nuclear weapons-free zone, with the parties banning the possession as well as stationing of other nations' nuclear weapons on their territories. [See also *Nuclear-Free Zones Continue to Grow* in October 2002 environmental security report.]

Military implications

The U.S. and other military forces have to assess the implications of the Central Asian Nuclear Weapon-Free Zone treaty for the bases they have in the region.

Source:

Central Asian Nuclear Weapon-Free Zone Clears Final Hurdle

http://gsn.nti.org/gsn/nw_20081211_1387.php

8.4 The Cluster Munitions Treaty Signed by 94 Nations

94 nations signed the new international treaty banning cluster munitions at a special conference in Oslo December 3–4, 2008. The agreement will become binding international law six months after 30 signatories have ratified it. Four countries have already ratified it: the Holy See; Ireland; Norway, and Sierra Leone. The treaty forbids states parties to produce, trade, and use cluster munitions, as well as requiring them to discourage other nations from using cluster munitions in joint military operations. Dozens of countries that signed are stockpilers, former producers, and users of the weapon, including 18 of 26 NATO nations, such as the UK, France, and Germany. The number of signatories is expected to increase rapidly. [See also *The Convention on Cluster Munitions Opens for Signature on December 2nd* and other related items in previous environmental security reports.]

Military Implications:

[Same as previous on this issue] Although the U.S. has yet to support the Cluster Munitions Convention, it would be wise for the military to make plans for the elimination of cluster bombs,

as international support for their prohibition continues to grow, including among key NATO allies.

Sources:

94 Nations Sign Global Ban on Cluster Munitions

<http://www.hrw.org/en/news/2008/12/04/94-nations-sign-global-ban-cluster-munitions>

Dozens of nations sign up to UN-backed treaty banning use of cluster bombs

<http://www.un.org/apps/news/story.asp?NewsID=29180&Cr=disarmament&Cr1>

Six EU states fail to sign cluster bomb ban

<http://euobserver.com/9/27231?rk=1>

Collateral damage. America won't sign a treaty banning cluster bombs. But can it use them now?

http://www.economist.com/world/international/displaystory.cfm?story_id=12780720

8.5 EU Updates the REACH System, and WEEE and RoHS Directives

The EU Member States agreed to align EU legislation on classification, labeling and packaging of substances and mixtures to the UN Globally Harmonized System, as part of a global effort to protect humans and the environment from hazardous effects of chemicals. The new regulation will complement the EU REACH system, which is already in force.

The European Commission proposed a revision of the Waste Electric and Electronic Equipment (WEEE) directives and restrictions on: the use of certain hazardous substances in electrical and electronic equipment (RoHS) for greater coherence with other EU regulations (such as the labeling system, the waste framework, and REACH), easier implementation and enforcement, and higher but more flexible targets. Concerning the WEEE directive, the current collection target of 4 kg per person per year would be replaced by a mandatory collection target equal to 65% of the average weight of electrical and electronic equipment placed on the market over the two previous years in each Member State. [See also *EC Enforces Compliance of National Legislation with EU Environmental Regulations* in October 2007 and other related items in previous environmental security reports.]

Military Implications:

[Same as previous on this issue] EC efforts to enforce environmental regulations will trigger further changes in EU Member States' national legislation. Military stationed in the EU countries should review compliance with EU environmental regulations, as applicable.

Sources:

EU Member States approve world-wide rules for labelling of chemicals

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1844&format=HTML&aged=0&language=EN&guiLanguage=en>

Environment: Commission proposes revised laws on recycling and use of hazardous substances in electrical and electronic equipment

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1878&format=HTML&aged=0&language=EN&guiLanguage=en>

8.6 EU Renewable Energy Policy becomes Legally Binding

The targets set by the EU 20/20/20 energy policy become legally binding for all member States by 2020. They are to cut greenhouse gas emissions by 20%, establish a 20% share for renewable energy, and improve energy efficiency by 20%. EU member states have to present their national

action plans by June 2010, and report on progress every two years. [See also *EU Leaders Support the 20/20/20 Energy Plan* in March 2008 and other related items in previous environmental security reports.]

Military Implications:

Military stationed in EU member states should review their actions to support the EU 20/20/20 energy policy and seek opportunities to apply the Army Strategy for the Environment.

Sources:

Climate change: Commission welcomes final adoption of Europe's climate and energy package
<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1998&format=HTML&aged=0&language=EN&guiLanguage=en>

Greens hail EU deal on renewable energy
<http://euobserver.com/9/27269/?rk=1>

8.7 Somali Piracy is also an Eco-terrorism Threat

The rise of piracy in Somalia's waters raised serious environmental and potential eco-terrorism concerns after the hijacking on November 15, 2008 of the large Saudi oil tanker, Sirius Star, reported to contain 2 million barrels of crude oil. While piracy may not present a direct threat to countries' national security, its consequences could have widespread effects. Nevertheless, the integrity of the international efforts to tackle piracy in the region (the UN Security Council resolution, the EU one-year "Atalanta" anti-piracy mission, and international coalition forces patrolling the region) is seriously undermined by allegations that the EU and Asian countries are unwilling or unable to stop companies that have been dumping toxic waste off the Somali coast for many years. The UN special envoy for Somalia, Ahmedou Ould Abdallah, has in the past few months repeatedly warned about illegal fishing and toxic dumping by European firms off Somalia's coast. [See also *Toxic Waste Disposal of Global Growing Concern* in September 2006 and other related items in previous environmental security reports.]

Military Implications:

The military involved in the anti-piracy actions should also consider using this opportunity to enforce international compliance with the Basel Convention for toxic waste treatment. Furthermore, it should eventually incorporate observing hazardous waste disposal procedures and trade as part of its security actions in countries where it has peacekeeping forces. This would also be consistent with the U.S. role, as a signatory, and the stewardship goal in the Army Strategy for the Environment.

Sources:

EU firms should stop toxic dumping off Somalia
<http://euobserver.com/9/27244/?rk=1>

Somalia's piracy problem is everyone's problem
<http://www.csmonitor.com/2008/1208/p09s01-coop.html>

8.8 Measures Needed to Quiet Underwater Noise

The UNEP Convention on Migratory Species conference held in Rome noted that human activities are making the marine environment noisier, as well as more acidic. The report *Ocean Noise: Turn it Down* by the International Fund for Animal Welfare states that low frequency underwater noise has doubled every 10 years over the past 50 years, and the number of ships has

tripled and is expected to double again by 2025. An alliance of wildlife groups warned that this is disturbing marine mammals that use sound to communicate and navigate and called upon governments to adopt regulations that impose quieter off-shore equipment and ship engines and less intrusive sonar technologies by navies. The EU submitted a draft resolution suggesting a wide range of measures, including noise protection areas, better monitoring of noise levels, databases with noise origins, and a set of guidelines for better managing noise sources.

In the meantime, a three-year lawsuit against the U.S. Navy by environmental groups concerning the Navy's use of sonar in oceans has been settled in a California court, requiring more extended research on the effects of sonar on whales and other marine mammals. (Note: this is a separate case from the November 2008 U.S. Supreme Court ruling that lifts restrictions on the Navy's use of sonar off the coast of California.) [See also *U.S. Supreme Court Rules in Favor of Navy in Sonar Case* in November 2008 and other previous environmental security reports on this issue.]

Military Implications:

[Similar to previous on this issue] Notwithstanding the Court's decision, continuous research producing additional evidence of dangers, as well as increasing advocacy from conservation groups and the EU, might trigger negotiations for international controls on the use of sonar and other acoustic systems. In the meantime, monitoring of marine mammals' presence in areas of sonar use should be incorporated in Navy policy to allow for responsiveness in the event that further changes of policy were to occur. To reduce the sound of ships, noise reduction devices such as equal but opposite amplitude devices could be considered.

Sources:

Noisy, Acid Oceans Increasingly Harmful to Whales

<http://www.ens-newswire.com/ens/dec2008/2008-12-03-03.asp>

Man-made noise in world's seas threatens wildlife

<http://www.reuters.com/article/environmentNews/idUSTRE4B26P920081203>

Settlement Reached Between Navy And Environmental Groups Over Sonar Use

<http://www.allheadlinenews.com/articles/7013545335>

8.9 Climate Change

More detailed descriptions of the following items are in the [Appendix](#)

8.9.1 Scientific Evidences and Natural Disasters

The UN reports that the number of disasters doubled over the past 20 years, reaching more than 400 annually, and it is expected that the intensity, frequency, duration and extent of weather-related hazards will rise over the next 20 years around the world. The UN Office for the Coordination of Humanitarian Affairs (OCHA) noted that in the period 1988-2007, over 75% of disasters were climate-related, and accounted for 45% of deaths and 80% of the economic losses caused by natural hazards. According to the World Meteorological Organization, in 2008 the average temperature on Earth was 0.31°C higher than the 1961–1990 levels, with serious changes in climate patterns. The British Met Office warns that the average global temperature for 2009 is expected to be more than 0.4°C above the long-term average, despite the La Niña phenomenon. ([more](#))

8.9.2 Food and Water Security

FAO warns that some 33 countries around the world are in need of external food assistance as a result of crop failures, conflict, or **other forms of food** insecurity; plus high domestic food prices. A study reveals that even in the best-case scenario, 1.7 billion people will face water shortage due to climate change already taking place; but the number could reach 3.2 billion, if action to tackle greenhouse gas emissions is delayed. Similarly, crop productivity will be affected through more frequent and more severe droughts, floods, and storms.

Low Carbon, High Growth: Latin American Responses to Climate Change estimates that, without adequate actions, climate change might reduce farm revenues by 12%–50% by 2100. The *Climate Change and Food Security in Pacific Island Countries* report notes that the region's food security is seriously affected by natural disasters and therefore national policies should include climate change adaptation strategies

The UK set up the Council of Food Policy Advisers in order to address the growing concern of food security and to find strategies to feed the growing world population. ([more](#))

8.9.3 Migration

The UN says that an estimated 6 million people a year could be displaced by climate change effects, meaning that by 2050, the numbers might be between 200 million and 250 million, putting heavy pressure on aid agencies to meet basic needs. The Poznan climate change conference didn't address international terminology concerning environmentally induced migration. Nevertheless, the European Parliament declaration adopted in June 2008 calling for a legal framework for the protection of the victims of climate events and other similar efforts of the global community increase the likelihood of addressing the international dimension of environmentally displaced people. ([more](#))

8.9.4 Melting Glaciers and Sea Ice

Researchers say that the amount of ice flowing out of Greenland this summer is nearly three times more than that lost last year. ([more](#))

8.9.5 Rising Sea Levels

New findings explain that most estimates of sea level rise are too conservative, revealing that factoring in thermal expansion due to warming waters and the latest data on melting glaciers and sea ice show that total sea level rise could reach about 1–2 meters by 2100. At the Poznan climate conference, a group of 43 small island states, saying that rising seas could wipe them off the map, called for tougher goals for emissions reductions and limiting global warming to a maximum of 1.5°C (2.7° Fahrenheit) above pre-industrial times. ([more](#))

8.9.6 Computer Modeling

Four models by the Met Office Hadley Centre on climate projections show the possible range of temperature rise by 2100 as a function of actions on greenhouse gas emissions. While all models show that some global warming by the end of the century is inevitable because of the CO₂ already in the atmosphere, they outline the direct dependency of temperature rise on actions to cut emissions. The most optimistic scenario shows a global temperature rise of 2–2.8°C with the condition that actions start in 2010 and emissions decrease 47% by 2050 at a sustained rate of 3% per year. In the worst-case (no action) scenario, temperatures could rise by 5.5–7.1°C, with significant and irreversible impacts. The two middle-case scenarios, based on slow emissions reductions, show possible temperature rises of 2.9–3.8°C in the case of actions starting in 2010, and 4–5.2°C, if action is delayed until 2030. ([more](#))

8.9.7 Adaptation

There are already several funds established to help the poorest countries implement projects to adapt to climate change, such as the Least Developed Countries Fund (established under the UNFCCC); the Central Emergency Response Fund (set up by the UN in 2006 to help in case of natural and man-made disasters) and the Kyoto Protocol's Adaptation Fund (to help developing countries cope with the effects of global warming).

Countries of the Asia-Pacific region, being the most populous and also most affected by disasters in terms of human and economic impacts, have to cooperate and increase investment in disaster risk reduction. Studies show that \$1 invested in disaster preparedness saves between \$4 and \$7 in humanitarian relief and reconstruction costs after a disaster happens. ([more](#))

8.9.8 Post-Kyoto Negotiations

The conference to advance negotiations for a post-2012 climate change regime, held in Poznan, Poland, December 1-12, 2008, made little progress on filling in the gap between rich countries' rhetoric and real commitments for addressing climate change. Nevertheless, procedural decisions were made for negotiating an effective new UN climate treaty to be agreed on at the Copenhagen meeting in December 2009. A first draft of the text would be presented at a UNFCCC conference to be held in June 2009, in Bonn. Also, UN Secretary-General Ban Ki-moon said that he is considering convening a summit focused on climate change, at the time of the General Assembly in September 2009. Progress was made by endorsing the Poznan Strategic Programme on Technology Transfer that aims to increase investments for mitigation and adaptation technologies in developing countries and by adopting a resolution for reducing greenhouse gas emissions from deforestation and forest degradation. ([more](#))

Military Implications:

[Same as previous on similar issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it may be called upon for both mitigation and adaption, and perform a gap analysis in anticipation of future requests. International discourse over climate change increases the emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

Sources: (see a more expanded list in the [Appendix](#))

UN, aid partners issue call for global efforts to slash climate-induced disaster risks

<http://www.un.org/apps/news/story.asp?NewsID=29175&Cr=disaster&Cr1=climate>

2009 To Be One Of Warmest Years On Record: Researchers

<http://planetark.org/wen/51066>

Crop Prospects and Food Situation, December 2008

<http://www.fao.org/docrep/011/ai476e/ai476e00.htm>

Food needs 'fundamental rethink'

<http://news.bbc.co.uk/2/hi/science/nature/7795652.stm>

INTERVIEW-UN says climate change may uproot 6 mln annually

<http://www.alertnet.org/thenews/newsdesk/B362707.htm>

Climate change refugees seek a new international deal

<http://www.climatechangecorp.com/content.asp?contentid=5871>

Abrupt Climate Change. Final Report, Synthesis and Assessment Product 3.4

<http://www.climatescience.gov/Library/sap/sap3-4/final-report/default.htm>

Climate change models. Likely effects of four emission reduction models

http://www.metoffice.gov.uk/research/hadleycentre/news/emissions_270908.pdf

Asian nations focus on disaster risk reduction as UN-backed meeting opens in Malaysia

<http://www.un.org/apps/news/story.asp?NewsID=29149&Cr=Natural+disaster&Cr1=>

Slow Progress in Poznan While Climate Threats Mount

<http://www.ens-newswire.com/ens/dec2008/2008-12-13-01.asp>

Fiddling with words as the world melts

http://www.economist.com/world/international/displaystory.cfm?story_id=12815686

German Scientist Warns Climate Change Accelerating

<http://www.dw-world.de/dw/article/0,,3907790,00.html>

8.10 Nanotechnology Safety Issues

Detailed descriptions of the following nanotechnology issues are in the [Appendix](#)

- New nanotube-based design yields more sensitive pathogen detector ([more](#))
- National Research Council report *Review of Federal Strategy for Nanotechnology-Related Environmental, Health, and Safety Research* calls for better nanotech risk assessment ([more](#))
- UNU report *Innovation in Responding to Climate Change: Nanotechnology, Ocean Energy and Forestry* assesses nanotech potential in addressing climate change ([more](#))
- Creation of the Tunisian Association of Nanotechnology to address potential benefits and risks of nanotechnology ([more](#))
- EU ENNSATOX project assesses the environmental and health impact of nanoparticles found in everyday products (including sunscreens) ([more](#))
- Publication of the proceedings of the European Commission Dialogue Workshop on Nanotechnology: Safety for Success, held in Brussels in October 2008, covering a number of topics in nanotech regulation and risk assessment ([more](#))
- EuroNanoForum 2009 with the topic “Nanotechnology for a Sustainable Economy” to be held in Prague, June 2-5, 2009, will include sessions such as “Environmental applications and implications of nanotechnology” and “Nanotechnology: education, standardization and social perception of benefits and risks” ([more](#))

Military Implications:

[Same as previous on this issue] Military personnel concerned with nanotech issues should contribute their views to these activities. Also, relevant military personnel should review the information generated by such activities to improve military and contractor practices, as well as to assist and cooperate with the organizations working on those issues for enriching their studies.

Sources:

Peptide nanotubes for highly sensitive pathogen sensors chips

<http://www.nanowerk.com/spotlight/spotid=8464.php>

Review of Federal Strategy for Nanotechnology-Related Environmental, Health, and Safety Research

http://www.nap.edu/catalog.php?record_id=12559

Innovation in Responding to Climate Change: Nanotechnology, Ocean Energy and Forestry

http://www.ias.unu.edu/resource_centre/Innovation%20in%20Responding%20to%20Climate%20Change_UNU-IAS%20Report.pdf

ENNSATOX

http://insciences.org/article.php?article_id=770

Sunscreen danger: Holidaying feds leave bathers waiting for suspect sunscreen list
<http://www.theage.com.au/national/holidaying-feds-leave-bathers-waiting-for-suspect-sunscreen-list-20081227-75x6.html?page=-1>

Tunisia: Environmental Use of Nanotechnologies Highlighted in Tunis Seminar
<http://allafrica.com/stories/200812180921.html>

Nano. Safety for Success Dialogue report
http://ec.europa.eu/health/ph_risk/documents/ev_20081002_rep_en.pdf
EuroNanoForum 2009
<http://www.euronanoforum2009.eu/>

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

8.9 Climate Change

8.9.1 Scientific Evidences and Natural Disasters

The UN Inter-Agency Standing Committee and the UN International Strategy for Disaster Reduction noted that the number of disasters doubled over the past 20 years, reaching more than 400 annually and it is expected that the intensity, frequency, duration, and extent of weather-related hazards will rise over the next 20 years around the world. The UN Office for the Coordination of Humanitarian Affairs (OCHA) noted that in the period 1988-2007, over 75% of disasters were climate-related, and accounted for 45% of deaths and 80% of the economic losses caused by natural hazards.

According to the World Meteorological Organization, in 2008 the average temperature on Earth was 0.31°C higher than the 1961–1990 levels, with serious changes in climate patterns, such as the warmest winter in more than 100 years in Scandinavia, the longest hot summer on record in parts of Australia, and unusual cold for a large part of Eurasia. Some parts of the U.S., India, Pakistan, Vietnam, and Bangladesh were the nations worst hit by the devastating effects of flooding and cyclones as a result of climate change, with tens of thousands of people losing their homes and more than 10 million displaced. The re-insurance company Munich Re said that 2008 was one of the most devastating years in terms of natural disasters, in both human and economic terms.

The British Met Office warns that the average global temperature for 2009 is expected to be more than 0.4°C above the long-term average, despite the La Niña phenomenon. NASA estimates that a 1°C increase in ocean surface temperatures could trigger a 45% increase in thunderhead formation, potentially increasing the frequency of severe tropical storms and their devastating impacts on developing countries by 6% in the next decade.

Other studies warn about climate change in different parts of the world: Latin America and the Caribbean might experience more destructive hurricanes and melting glaciers; New Zealand is threatened by drought, while the Arctic might have reached the point of irreversible climate change with temperatures rising much faster than anywhere else in the world.

8.9.2 Food and Water Security

FAO's *Crop Prospects and Food Situation* report warns that some 33 countries around the world are in need of external food assistance as a result of crop failures, conflict or other forms of food insecurity and high domestic food prices. Although cereal harvests in 2008 reached record highs, with wheat and rice production at over 2 billion tons—more than a 5% rise over 2007, most increases were achieved in richer nations.

Martin Parry, former co-chair of an Intergovernmental Panel on Climate Change (IPCC) working group and lead author of its 2007 report, calculated that the more the year of greenhouse gas emissions reduction is delayed, the higher will be the negative impact on food and water

supply, health, coastal areas, and other ecosystems. His study reveals that even in the best-case scenario, 1.7 billion people will face water shortage due to climate change already taking place. This could potentially reach 3.2 billion, if action is delayed. Similarly, crop productivity will be affected through more frequent and more severe droughts, floods, and storms.

In Africa, as 21 countries are affected by food crises, governments should double the percentage of national budgets allocated to increase farm output, improve water sharing, and adopt policies to adapt to climate change, agreed ministers attending a water conference in Libya. Africa's population of 967 million, of whom 53% are under the age of 20, is forecast to reach 2 billion in 2050. The UNDP Poverty and Environment Initiative implemented in Malawi and other 10 African countries aims to address food security by including environmental objectives such as combating soil erosion, deforestation, and water pollution in development programs.

Low Carbon, High Growth: Latin American Responses to Climate Change estimates that without adequate actions, climate change might reduce farm revenues by 12%–50% by 2100. *Climate Change and Food Security in Pacific Island Countries*, a report by FAO, the Secretariat of the Pacific Regional Environment Programme, and the University of the South Pacific, notes that the region's food security is seriously affected by natural disasters. Therefore, says Alexander Müller, FAO Assistant Director-General, Natural Resources Management and Environment Department, “integrating climate change adaptation into national policies, strategies, programmes and budgets related to agriculture, forestry and fisheries should become a major priority.” In the Solomon Islands, food security and livelihood of villagers of Luaniua and Pelau, are already affected by continuous tidal surge onto the land, reports the Ministry of Home Affairs and the National Disaster Management Office.

The UK set up the Council of Food Policy Advisers in order to address the growing concern of food security and find strategies to feed the world's growing population. Professor Lang, member of the newly formed Council, lists “new fundamentals” that will shape future food production, including: oil and energy price volatility; water scarcity, through auditing foods' water requirements; biodiversity replacement and enhancement by changing practices of land use and food growing; urbanization; and complete use of produce independently of appearance.

Global warming and melting of Tibetan glaciers might produce 15 million “environmental refugees” in South Asia and conflicts within Punjab and Sindh, warns Simi Kamal, member of the Stockholm-based Global Water Partnership Technical Committee, adding that water distribution is political in nature and needs to be resolved in order to avoid conflict.

8.9.3 Migration

An estimated 6 million people a year could be displaced by climate change effects, meaning that by 2050, the numbers might be between 200 million and 250 million, putting heavy pressure on aid agencies to meet basic needs, said L. Craig Johnstone, UN Deputy High Commissioner for Refugees. At the Poznan climate change conference, discussions concerning environmentally induced migration focused on helping countries to address the problem within their borders by implementing climate change adaptation measures, rather than considering international aspects. Nevertheless, the European Parliament declaration adopted in June 2008 calling for a legal framework for the protection of the victims of climate events and other similar efforts of the global community increase the likelihood of addressing the international dimension of environmentally induced migration.

8.9.4 Melting Glaciers and Sea Ice

Researchers say that the amount of ice flowing out of Greenland this summer is nearly three times more than that lost last year.

8.9.5 Rising Sea Levels

A compilation by a team of researchers from the University of Colorado at Boulder shows that when factoring in thermal expansion due to warming waters, total sea level rise could reach about 1–2 meters by 2100. They considered glaciological assumptions for sea rise expected from Greenland, Antarctica and the world's smaller glaciers and ice caps. Along the same lines, the *Abrupt Climate Change* report by the US Geological Survey found that sea level rise could exceed forecasts, possibly reaching 150 cm by the end of the century, an estimate which itself might “likely need to be revised upwards” because it doesn't fully count the ice flow processes. Jim Hansen, of NASA, also says that most estimates of sea level rise are too conservative, since climate system feedback could quickly accelerate ice melt, leading to a runaway collapse.

At the Poznan climate conference, a group of 43 small island states, saying that rising seas could wipe them off the map, called for tougher goals for emissions reductions and limiting global warming to a maximum of 1.5°C (2.7° Fahrenheit) above pre-industrial times, which is far lower than the EU suggested 2°C. “We are not prepared to sign a suicide agreement that causes small island states to disappear,” said Selwin Hart of Barbados, a coordinator of the alliance of small island states, referring to a too weak climate change agreement.

A sudden sea swell hit Papua New Guinea in December, affecting some 32,000 peoples and their livelihood. A UN Disaster Assessment and Coordination (UNDAC) team went to the area to assess first aid needs.

8.9.6 Computer Modeling

Four models by the Met Office Hadley Centre on climate projections show the possible range of temperature rise by 2100 as a function of actions in greenhouse gas emissions. While all models show that some global warming by the end of the century is inevitable because of the CO₂ already in the atmosphere, they outline the direct dependency of temperatures rise on actions to cut emissions. The most optimistic scenario shows global temperature rise of 2–2.8°C with the condition that actions start in 2010 and emissions decrease 47% by 2050 at a sustained rate of 3% per year. In the worst-case (no action) scenario, temperatures could rise by 5.5–7.1°C, with significant and irreversible impacts. The two middle-case scenarios, based on slow emissions reductions, show possible temperature rises of 2.9–3.8°C in the case of actions starting in 2010, and 4–5.2°C if action is delayed until 2030.

8.9.7 Adaptation

The Least Developed Countries Fund, established under the UNFCCC and managed by the Global Environment Facility to help the poorest countries implement urgent projects to adapt to climate change, might need \$1 billion, said Boni Biagini, who runs the fund. So far, only \$172 million was pledged to the fund. Nevertheless, the Central Emergency Response Fund, set up in 2006 to help in case of natural and man-made disasters, has surpassed its annual target, reaching \$452.5 million, with some of the 101 contributing nations significantly increasing their donations for 2009, announced the UN Office for the Coordination of Humanitarian Affairs. Meanwhile, at the Poznan climate change conference, it was agreed that the board of the Kyoto

Protocol's Adaptation Fund would have the legal capacity to grant developing countries direct access to about \$60 million to help them cope with the effects of global warming. However, the suggestion by some delegates to increase from 2% to 3% the share of proceeds from the Clean Development Mechanism that finances the Adaptation Fund was rejected. The UN estimates that \$86 billion per year might be needed by 2015 for poor countries to adapt to global warming, while some aid groups are calling for at least \$50 billion.

At the Third Asian Ministerial Conference on Disaster Risk Reduction held in Kuala Lumpur, Malaysia, government officials from more than 40 Asian countries discussed partnerships and regional cooperation for disaster preparedness and early warning systems. The Asia-Pacific region is the most populous and also most affected by disasters in terms of human and economic impacts, according to the UN International Strategy for Disaster Reduction. Greater investment in disaster risk reduction is crucial for the region's development and to reduce relief costs, since studies show that \$1 invested in disaster preparedness saves between \$4 and \$7 in humanitarian relief and reconstruction costs after a disaster happens.

The UN Disaster Assessment and Coordination (UNDAC) organized disaster-awareness training programs in Russia for members of the Commonwealth of Independent States and in the Middle East. In 2009 it will do so in the West African region. All countries, which join the system, must receive the training. Since its inception in 1993, UNDAC has deployed 183 missions to assist countries affected by disasters.

8.9.8 Post-Kyoto Negotiations

Over 11,000 participants from 190 nations attended the conference held in Poznan, Poland, December 1-12, 2008 to advance negotiations for a post-2012 climate change regime.. Despite little progress on filling in the gap between rich countries' rhetoric and real commitments for addressing climate change (partly due to the global financial conditions), procedural decisions were made and there were commitments from governments for negotiating an effective new UN climate treaty and response to climate change to be agreed at the Copenhagen meeting in December 2009. A first draft of the text would be presented at a UNFCCC conference to be held in June 2009, in Bonn. Also, UN Secretary-General Ban Ki-moon said that he is considering convening a summit focused on climate change at the time of the General Assembly in September 2009. While a few industrialized countries openly undermined progress, most developing countries came with clear and constructive proposals. Progress was made in the area of technology transfer with the endorsement of the Poznan Strategic Programme on Technology Transfer that aims to increase investments for mitigation and adaptation technologies in developing countries and in reducing greenhouse gas emissions from deforestation and forest degradation.

Hans Joachim Schellnhuber, head of the Potsdam Institute for Research on Global Warming Effects and adviser to German Chancellor Angela Merkel on climate-change issues, says that in order to avoid a disastrous climate change, global CO₂ emissions would need to be reduced 50% by 2050, meaning an 80%–90% decrease for industrial countries.

Sources: (a more expanded list)

8.9.1 Scientific Evidences and Natural Disasters

UN, aid partners issue call for global efforts to slash climate-induced disaster risks

<http://www.un.org/apps/news/story.asp?NewsID=29175&Cr=disaster&Cr1=climate>

2009 To Be One Of Warmest Years On Record: Researchers

<http://planetark.org/wen/51066>

CLIMATE CHANGE: Another Record Year for Heat, Storms

<http://ipsnews.net/news.asp?idnews=45151>

2008 One Of The Worst Years For Disaster Losses: Insurer

<http://planetark.org/wen/50856>

Warming fuels rise in tropical storms

<http://www.canberratimes.com.au/news/local/news/general/warming-fuels-rise-in-tropical-storms/1395641.aspx>

The accidental environmentalists

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Point of No Return for the Arctic Climate?

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8.9.2 Food and Water Security

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<http://www.fao.org/docrep/011/ai476e/ai476e00.htm>

Get ready for worse climate change impacts: expert

<http://news.smashits.com/328202/Get-ready-for-worse-climate-change-impacts-expert.htm>

African Ministers Say Share Water To Combat Hunger

<http://planetark.org/wen/50955>

UNDP helps Malawi to environmental degradation

<http://www.dailytimes.bppmw.com/article.asp?ArticleID=11657>

The accidental environmentalists. More reasons to stop deforestation

http://www.economist.com/world/americas/displaystory.cfm?story_id=12775599

Food security in Pacific islands at risk from climate change-related disasters – UN

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Islanders go hungry as rising waters destroy food crops

http://solomonstarnews.com/index.php?option=com_content&task=view&id=5475&change=71&changeown=78&Itemid=26

Food needs 'fundamental rethink'

<http://news.bbc.co.uk/2/hi/science/nature/7795652.stm>

'Nearly 15 million environmental refugees likely'

<http://www.thenews.com.pk/print1.asp?id=154569>

8.9.3 Migration

INTERVIEW-UN says climate change may uproot 6 mln annually

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Climate change refugees seek a new international deal

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8.9.4 Melting Glaciers and Sea Ice

Greenland's Glaciers Losing Ice Faster This Year Than Last Year

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8.9.5 Rising Sea Levels

Ice sheet at risk

<http://www.guardian.co.uk/environment/2008/dec/09/poznan-ice-sheet-sea-level-greenland-arctic>

UN disaster team arrives in flood-stricken Papua New Guinea

<http://www.un.org/apps/news/story.asp?NewsID=29394&Cr=papua&Cr1=ocha>

Sea level could rise by 150cm, US scientists warn

<http://www.guardian.co.uk/environment/2008/dec/16/climatechange-scienceofclimatechange>

Abrupt Climate Change. Final Report, Synthesis and Assessment Product 3.4

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Island states seek tougher U.N. climate deal

<http://ca.reuters.com/article/environmentNews/idUSTRE4B234420081203?sp=true>

Flood-stricken Papua New Guinea receives UN assistance

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8.9.6 Computer Modeling

Climate change models. Likely effects of four emission reduction models

http://www.metoffice.gov.uk/research/hadleycentre/news/emissions_270908.pdf

Met Office warn of 'catastrophic' rise in temperature

<http://www.newscientist.com/article/dn16307-arctic-melt-20-years-ahead-of-climate-models.html>

8.9.7 Adaptation

Poorest need \$1 bln for urgent climate projects

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UN emergency response fund this year reaches its \$450 million target for first time

<http://www.un.org/apps/news/story.asp?NewsID=29439&Cr=cerf&Cr1=>

U.N. climate adaptation fund running out of cash

<http://www.alertnet.org/thenews/newsdesk/L6349998.htm>

Asian nations focus on disaster risk reduction as UN-backed meeting opens in Malaysia

<http://www.un.org/apps/news/story.asp?NewsID=29149&Cr=Natural+disaster&Cr1=>

Rise in extreme weather events fuelling demand for UN disaster management expertise

<http://www.un.org/apps/news/story.asp?NewsID=29405&Cr=UNDAC&Cr1=>

Slow Progress in Poznan While Climate Threats Mount

<http://www.ens-newswire.com/ens/dec2008/2008-12-13-01.asp>

8.9.8 Post-Kyoto Negotiations

U.N. Chief Tells World: We Need A Green New Deal

<http://planetark.org/wen/50878>

Slow Progress in Poznan While Climate Threats Mount

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UN climate talks stalling thanks to EU weakness

http://www.wwf.org.uk/what_we_do/press_centre/index.cfm?uNewsID=2552

Fiddling with words as the world melts

http://www.economist.com/world/international/displaystory.cfm?story_id=12815686

Dispute on carbon tax mars climate talks

<http://www.iht.com/articles/ap/2008/12/13/europe/EU-Poland-Climate-Talks.php>

CLIMATE CHANGE: Poznan Produces a 'Vision Gap'

<http://www.ipsnews.net/news.asp?idnews=45103>

Dispute on carbon tax mars climate talks

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UN Climate Chief Says Comprehensive Treaty May Not Come by 2009

<http://www.bloomberg.com/apps/news?pid=20601082&sid=a4T0Jeo1WFXY&refer=canada>

Climate change: A battle for the planet

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U.N. climate adaptation fund running out of cash

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U.N. chief may call climate summit in September 2009

<http://planetark.org/wen/50884>

German Scientist Warns Climate Change Accelerating

<http://www.dw-world.de/dw/article/0,,3907790,00.html>

Time to prepare for disasters caused by climate change is now, says UN

<http://www.un.org/apps/news/story.asp?NewsID=29154&Cr=Disaster&Cr1=Climate>

8.10 Nanotechnology Safety Issues

8.10.1 New Nanotube-based Design Yields More Sensitive Pathogen Detector

Hiroshi Matsui, professor of bionanotechnology at Hunter College in New York, and collaborators from the Nanobiosensors and Molecular Nanobiophysics Group at the Research Center on Nanoscience and Nanotechnology at Universitat Autònoma de Barcelona in Spain, developed a new design for lab-on-a-chip pathogen (e.g., bacteria and viruses) detection devices, using an AC-driven peptide nanotube capacitance probe to increase sensitivity of the element. It appears that the design can be scaled up to provide multiple-threat detection in a single device, although there are challenging problems with registration of a number of electrodes.

Military Implications:

The military should follow this work to ascertain its applicability in systems for detecting biological organisms and toxins in the environment.

Source:

Peptide nanotubes for highly sensitive pathogen sensors chips

<http://www.nanowerk.com/spotlight/spotid=8464.php>

8.10.2 National Research Council Calls for Better Nanotech Risk Assessment

The National Research Council issued a new report, *Review of Federal Strategy for Nanotechnology-Related Environmental, Health, and Safety Research*, that, "finds serious weaknesses in the government's plan for research on the potential health and environmental risks posed by nanomaterials", and emphasizes that, "An effective national plan for identifying and managing potential risks is essential to the successful development and public acceptance of nanotechnology-enabled products".

Military Implications:

Military personnel concerned with nanotech risk assessment should review this report and consider its findings and recommendations in their planning and assessments.

Sources:

Federal Research Plan Inadequate to Shed Light on Health and Environmental Risks Posed by Nanomaterials (News release)

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12559>

Review of Federal Strategy for Nanotechnology-Related Environmental, Health, and Safety Research report

http://www.nap.edu/catalog.php?record_id=12559

8.10.3 UN Report Assesses Nanotech and Climate Change

The Institute of Advanced Studies of the United Nations University issued a new report, *Innovation in Responding to Climate Change: Nanotechnology, Ocean Energy and Forestry*, that, "offers three innovative solutions in responding to climate change, namely nanotechnology, ocean energy and forestry", critically assesses, "the opportunities and challenges that each type of innovation presents", and, "addresses the question why these innovations—despite their large potential to reduce emissions, ocean energy alone could cover the world's electricity needs—have not yet reached the stage of mass commercialization."

Military Implications:

Military personnel concerned with nanotech and energy efficiency issues should review this report and consider its findings and recommendations in their planning.

Sources:

Innovation in Responding to Climate Change: Nanotechnology, Ocean Energy and Forestry

http://www.ias.unu.edu/sub_page.aspx?catID=8&ddlID=738

Innovation in Responding to Climate Change: Nanotechnology, Ocean Energy and Forestry

http://www.ias.unu.edu/resource_centre/Innovation%20in%20Responding%20to%20Climate%20Change_UNU-IAS%20Report.pdf

8.10.4 Tunisian Nanotech Association Formed

The creation of the Tunisian Association of Nanotechnology has been announced. The Minister of the Environment and Sustainable Development noted, "...the seminal importance of the use of nanotechnologies on the prevention of pollution, water desalination, and the environment", and cautioned that the use of nanotechnology should go, "hand in hand with risk assessment measures to ensure a sound use of these new technologies." According to allAfrica.com, he also announced that the Tunis Environmental Centre of Environmental Technologies (CITET) would open its laboratories to members of the association

Military Implications:

Appropriate military personnel in Tunis should establish contact with the Association and the Environmental Centre for the exchange of ideas on nanotech risk assessment.

Sources:

Meridian Nanotechnology and Development News, Headlines for: 12/19/2008
Tunisia: Environmental Use of Nanotechnologies Highlighted in Tunis Seminar
<http://allafrica.com/stories/200812180921.html>

8.10.5 EU to Fund Nanoparticle Environmental Risk Study

The EU is launching a new project, ENNSATOX, led by Dr Andrew Nelson, a chemist at the University of Leeds, to investigate the environmental impact of nanoparticles found in everyday products, such as suntan cream, including the relationship between the physical structure of nanoparticles and their toxicity. The project has been awarded €3 million, and will involve scientists from five countries.

This new project is especially significant since research has not yet settled the question of whether metallic compound nanoparticles in preparations, like sunscreens, applied to the skin constitute a health risk. According to a published report, an inquiry by the New South Wales Parliament in Australia has, “concluded that nano versions of existing chemicals should be assessed as new chemicals and recommended that ‘ingredient labelling requirements for sunscreens and cosmetics include the identification of nano-scale materials’”. The same report states, “The [Therapeutic Goods Administration] estimates about 70 per cent of sunscreens with titanium dioxide and 30 per cent with zinc oxide have these materials in a nanoparticle form.” The ENNSATOX project will pay particular attention to this family of compounds.

Military Implications:

Military personnel concerned with nanotech risk assessment should follow the ENNSATOX investigations and be prepared to take action based on its findings, and also be prepared for possible eventual regulations on nanoparticle usage.

Sources:

ENNSATOX: http://insciences.org/article.php?article_id=770
Sunscreen danger: Holidaying feds leave bathers waiting for suspect sunscreen list
<http://www.theage.com.au/national/holidaying-feds-leave-bathers-waiting-for-suspect-sunscreen-list-20081227-75x6.html?page=-1>

8.10.6 European Nanotech Safety Proceedings Published

The proceedings of the European Commission Dialogue Workshop on Nanotechnology: Safety for Success, held in Brussels in October, have been published online, covering a number of topics in nanotech regulation and risk assessment.

Military Implications:

Military personnel concerned with nanotech risk assessment should review the proceedings and eventually consider the findings and recommendations in their planning.

Sources:

2nd Annual Nanotechnology Safety for Success Dialogue Workshop, 2-3 October 2008
http://ec.europa.eu/health/ph_risk/ev_20081002_en.htm

Nano. Safety for Success Dialogue report

http://ec.europa.eu/health/ph_risk/documents/ev_20081002_rep_en.pdf

8.10.7 EuroNanoForum 2009 To Be Held in Prague, June 2-5, 2009,

The fourth international nanotechnology conference, EuroNanoForum 2009, an official event of the EU, will be held in Prague, June 2-5, 2009, with the topic “Nanotechnology for a Sustainable Economy”. Among the individual sessions will be “Environmental applications and implications of nanotechnology” and “Nanotechnology: education, standardization and social perception of benefits and risks”.

Military Implications:

Military personnel in the continental U.S. and in Europe with nanotech- and environment-related responsibilities should consider attending this event to keep apprised of the latest developments in the field.

Source:

EuroNanoForum 2009

<http://www.euronanoforum2009.eu/>